Contributions to knowledge of herpetofauna from Rodna Mountains National Park (Natura 2000 site)

Author: Iușan Claudiu

Keywords: herpetofauna, amphibians, reptiles, protected, vulnerable

Abstract

Following the herpetological inventory of 2004-1417 in the National Park and the Natura 2000 Rodna Mountains, 24 species were identified in 10 mountain valleys, including 13 species of amphibians and 11 species of reptiles. The herpetological records were applied between 500-2303 m altitude.

Some species are common (*Triturus montandoni, Rana dalmatina, Bombina variegata, Bufo bufo, Zootoca vivipara, Natrix natrix, Lacerta agilis*) and other species have isolated populations in certain habitats of the Rodna Mountains National Park (*Podarcis muralis* on Corongis limestone, *Triturus cristatus, Emys orbicularis, Hyla arborea*).

Of the 24 species listed by amphibians and reptiles, 3 species are of community interest (*Triturus montandoni, Triturus cristatus, Bombina variegata*), 13 species are strictly protected (Annex II of Law 13/1993), 9 species are vulnerable in Romania.

Introduction

The study aim to update the data about fauna of amphibians and reptiles in the Rodna Mountains National Park as a result of observations during the period 2004-2017. The previous publications on the herpetofauna in the massif and the surroundings of Rodna Mountains (Andrei, 1997; Ardelean&Bereş, 2000; Bereş, 1997; Borcea, 1983; Cogălniceanu et al, 2007; Ghira et al., 1998; Torok&Bereş, 1995). Although there are a number of temporary observations on the herpetofauna of the Rodna Massif, complex herpetological research has not been carried out so far.

Rodna Mountains National Park is the second national park in the country (Figure 1), with an area of 47.202 ha. The importance of this protected area is due both to the geology and geomorphology of the mountains as well as to the presence of numerous species of fauna and

https://biblioteca-digitala.ro

flora, endemites and glacial relics. The Rodna Mountains is hosting the highest altitudes in the Eastern Carpathians (Pietrosu Mare Peak – 2.303 m; Inău Peak 2.279 m, Inăuţ Peak 2.222 m), are located in the northern part of Romania. Being included in the Nordic group, also known as the Carpathians of Maramures and Bucovina, these mountains dominate the landscape, with the highest level differences in the Maramureş Depression, located to the north (Figure 2). From dministrativ point of view, the park extends in Maramureş and Bistriţa-Năsăud counties. The Rodna Mountains National Park does not include the entire chain of the Rodna Mountains but only a part of them. From the West to the East, along a main ridge of about 55 km (from Şetref Pass to the Rotunda Pass), and from North to South, on a 25 km length, from Prislop Pass to Valea Vinului – Bistrişa-Năsăud county. From an administrative point of view, the park's area is spread over the districts of Bistriţa-Năsăud (80%) and Maramureş (20%), surrounded by 17 neighboring communes.

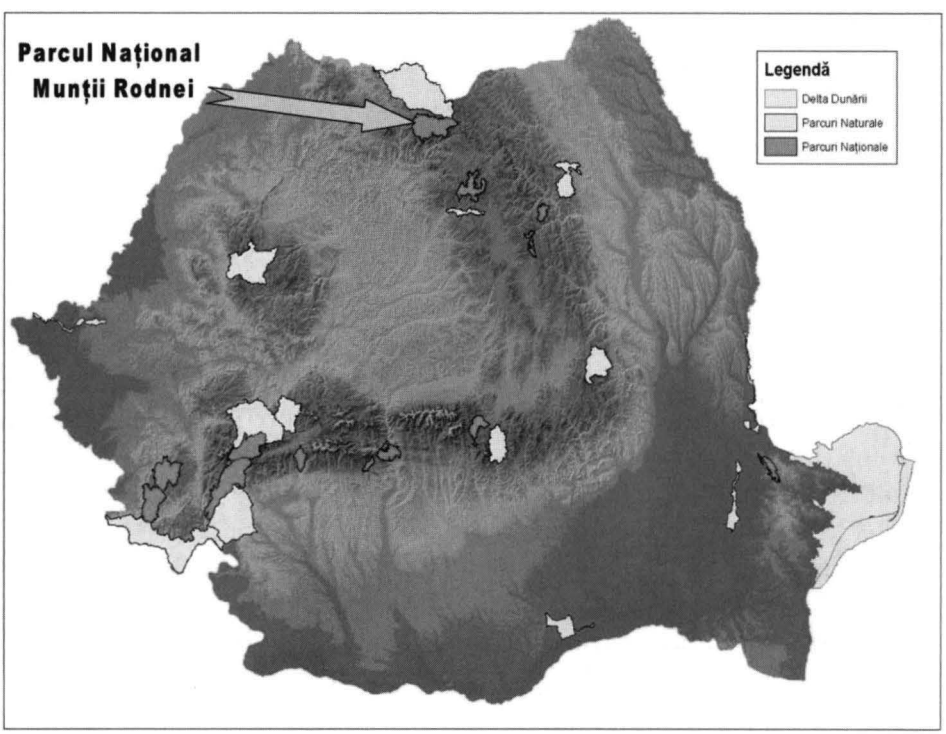

Fig. 1 Localization of the research area - Rodna Mountains National Park

https://biblioteca-digitala.ro

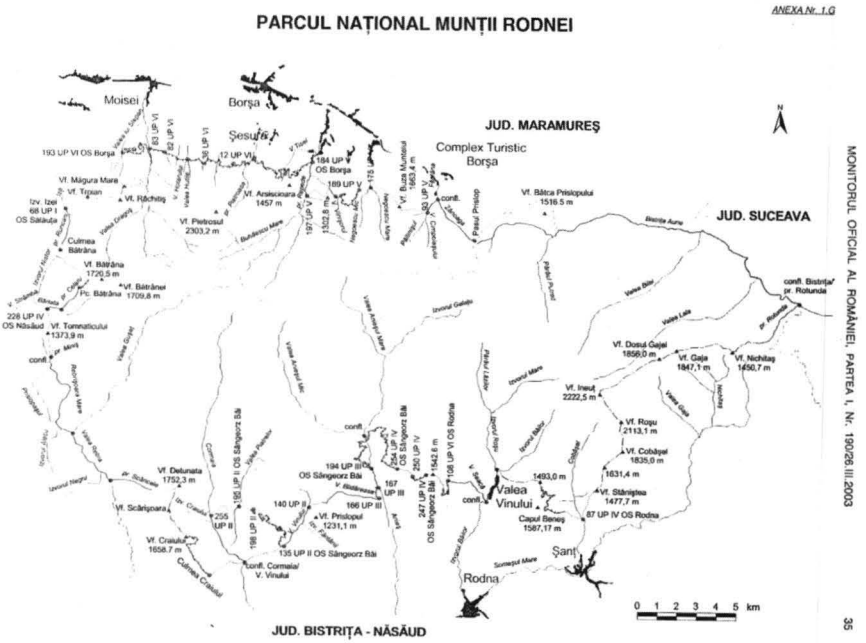

Fig. 2 Researched area - Rodna Mountains National Park

Amphibians and reptiles are excellent indicators of climate change as they are in a global decline, according to recent global studies (Whitfield et al., 2000; Beebee and Griffiths, 2005). The observations presented in this article are the result of repeated visits to the site as a result of the monitoring of representative species and habitats by the of Rodna Mountains National Park Administration.

Data regarding amphibians and reptiles from Rodna Mountains are very poor. For amphibians, Fuhn (1960) mentions five species and subspecies esăeciallz from Maramureş county. In some papers, *Bombina variegata* is also mentioned for Maramures, but no other data.

For reptiles, Fuhn & Vance (1961) mention six species and subspecies. *Vipera berus* is mentioned in text for Rodna Mountains but it also appears on the distribution map for Borşa too. In the above mentioned works, each species/subspecies is mentioned for one-two

https://biblioteca-digitala.ro

localities only. Margareta Borcea (1983) published a paper in which she made some zoogeographical considerations on Pietrosu Mare. Bereş I. (1990) includes a checklist of amphibians and reptiles and references to *Triturus montandoni* and he mentions it from Sighetu Marmaţiei.

Materials and methods

The study was carried out between 2004 and 2017. The herpetological transect method was used, making numerous surveys in each area investigated. Some specimens of amphibians and reptiles were largely determined directly without the need to capture them. The transits were made along 10 mountain valleys in the Rodna Mountains, usually the beginning of the transect being the limit of the protected area upstream. In some long valleys, the transects have been repetead from 5 to 5 km, some valleys reaching 35 km (Anieş Valley, Parva Valley, Rebra Valley, Cormaia Valley). The length of a transect was 500 m. The altitude between which the transects were applied ranges between 500-2.303 m.

When capturing specimens was mandatory, it was usually done manually and the guides for determination were used (Cogălniceanu, 2002, Torok et al., 2013, Iuşan, 2013). Amphibians during the breeding period were captured using herpetological traps and Barber traps. After determining the captured species, they were released into their habitats of origin. An important role in the inventory of herpetofauna in the studied region was played by the dead animals that we found, killed either by locals or by cars.

The hybrids were determined according to their morphological and chromatic characteristics, the determination being made according to the main characteristics and measurements indicated in the literature (Berger 1966, 1973, Cogălniceanu et al 2000, Ghira&Mara, 2000; Strugariu et al., 2006; Szymura 1993).

Results and discussions

The areas for application of herpetological transects are presented in Table 1.

https://biblioteca-digitala.ro

Table 1. Investigated habitats of herpetological fauna observation in the Rodna Mountains National Park during 2004-2017

No.	Investigated area	Habitat type	Altitude (m)	Code
1	Casa Laborator – Izvorul lui Dragoş	Ecoton of coniferous forest, mixed forest, valley	900-1.400	CL
2	Căldarea glaciară Gagi	Pasture with *Pinus mugo* bushes, *Juniperus communis, Rhododendron*	900-1.500	CG
3	Valea Vinului	Ecoton of mixed forest and mountain valley	700-1.500	VV
4	Valea Anieşului	Limestone rocks, meadow, coniferous forest	500-1.500	VA
5	Valea Lala	Pasture with *Pinus mugo* bushes, *Juniperus communis, Rhododendron*	800-1.800	VL
6	Valea Cobăşelului	Ecoton of mixed forest and mountain valley	800-1.700	VC
7	Valea Pietroasa	Pasture with *Pinus mugo* bushes, *Juniperus communis, Rhododendron*, glacial lakes, temporary ponds	800-2.303	VP
8	Valea Bila	Wetlands, mountain springs, ecoton of couniferous forests, temporarz ponds	700-2.000	VB
9	Corongişul Mic	Calcareous rocks with meadows, springs, valleys, temporary and permanent ponds, wetlands, mixed forests	700-2.000	CM
10	Piatra Rea	Calcareous rocks with meadows, ponds, valleys, springs, wetlands, mixed forests	800-1.800	PR

The inventory of amphibian and reptile species during the period 2004-2017 is presented in Table 2. The code of areas for application of herpetological transects are presented in Table 1.

https://biblioteca-digitala.ro

Table 2. Inventory of herpetofauna in the Rodna Mountains National Park and its surroundings during 2004-2017

No.	Species	Location (code)									
		CL	CG	VV	VA	VL	VC	VP	VB	CM	PR
1	*Salamandra salamandra* (Salamander) syn. *Mesotriton alpestris*	x		x	x	x	x	x	x	x	x
2	*Triturus alpestris* (Alpine newt)	x	x								
3	*Triturus montandoni* (Carpathian newt) syn. *Lissotriton montandoni*	x		x	x	x	x	x	x	x	x
4	*Triturus vulgaris* (Common newt) syn. *Lissotriton vulgaris*			x	x						x
5	*Triturus cristatus* (Northern crested newt)				x						
6	*Bombina variegata* (Yellow-bellied toad)			x	x	x	x	x	x	x	x
7	*Bufo viridis* (European green toad) syn. *Pseudepidalea viridis*			x	x					x	x
8	*Bufo bufo* (Common toad)	x	x	x	x	x	x	x	x		
9	*Rana temporaria* (Common frog)	x	x	x	x	x	x			x	x
10	*Rana dalmatina* (Agile frog)	x		x	x	x	x	x	x	x	x
11	*Rana ridibunda* (Eurasian marsh frog) syn. *Pelophylax ridibundus*			x	x	x					
12	*Rana esculenta* (Edible frog) syn. *Pelophylax esculentus*				x						
13	*Hyla arborea* (European tree frog)			x	x						
14	*Lacerta agilis* (Sand lizard)			x	x	x	x	x	x	x	x
15	*Zootoca vivipara* (Viviparous	x	x	x	x	x	x	x	x	x	x

https://biblioteca-digitala.ro

No.	Species	Location (code)									
		CL	CG	VV	VA	VL	VC	VP	VB	CM	PR
	lizard)										
16	*Natrix natrix* (Grass snake)	x	x	x	x		x	x	x	x	x
17	*Vipera berus* (Common European viper)	x	x			x	x			x	x
18	*Elaphe longissima* (Aesculapian snake) syn. *Zamenis longissimus*			x	x	x	x			x	x
19	*Anguis fragilis* (Slow worm)	x		x	x	x	x	x	x		
20	*Podarcis muralis* (Common wall lizard)									x	x
21	*Lacerta viridis* (Green lizard)			x							
22	*Coronella austriaca* (Smooth snake)			x	x	x	x			x	x
23	*Natrix tesselata* (Dice snake)			x	x						
24	*Emys orbicularis* (European pond turtle)			x							
Number of species		10	6	19	19	14	13	9	9	13	14

https://biblioteca-digitala.ro

Following the observations carried out during 2004-2017, 13 species of amphibians and 11 reptile species were found in the Rodna Mountains National Park and the adjacent area. Regarding the richness of species of the studied areas, it can be observed that some mountain valleys contain a larger number of species than other investigated areas (Figure 3).

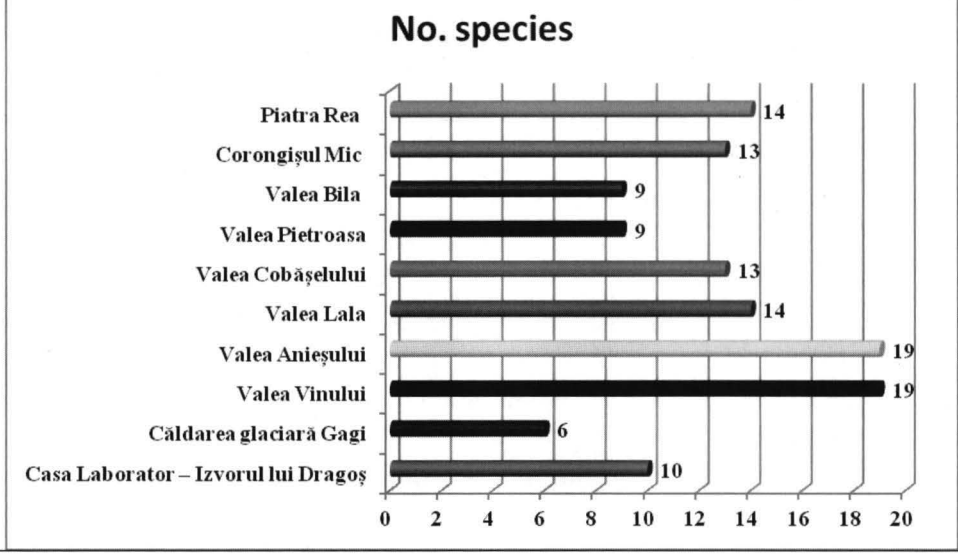

Fig. 3 The richness of species in the areas investigated in the Rodna Mountains National Park

The existence of a large number of species of amphibians and reptiles in Anieş Valley and Vinului Valley is due to the fact that these basins have the largest surface of the Rodna massif and contain a high diversity of habitats distributed over an altitude range of 600-2.200 m (forests deciduous valleys, mountain valleys, temporary ponds, ponds, glacial lakes, mountain springs, peat bogs, oligotrophy marshes). Also, the large length of these valleys (25-30 km) supported the application of a larger number of herpetological transects. These valleys contain 79% of the total species identified in the Rodna Mountains National Park.

Some species are more common and some more rare in the investigated habitats (Figure 4).

https://biblioteca-digitala.ro

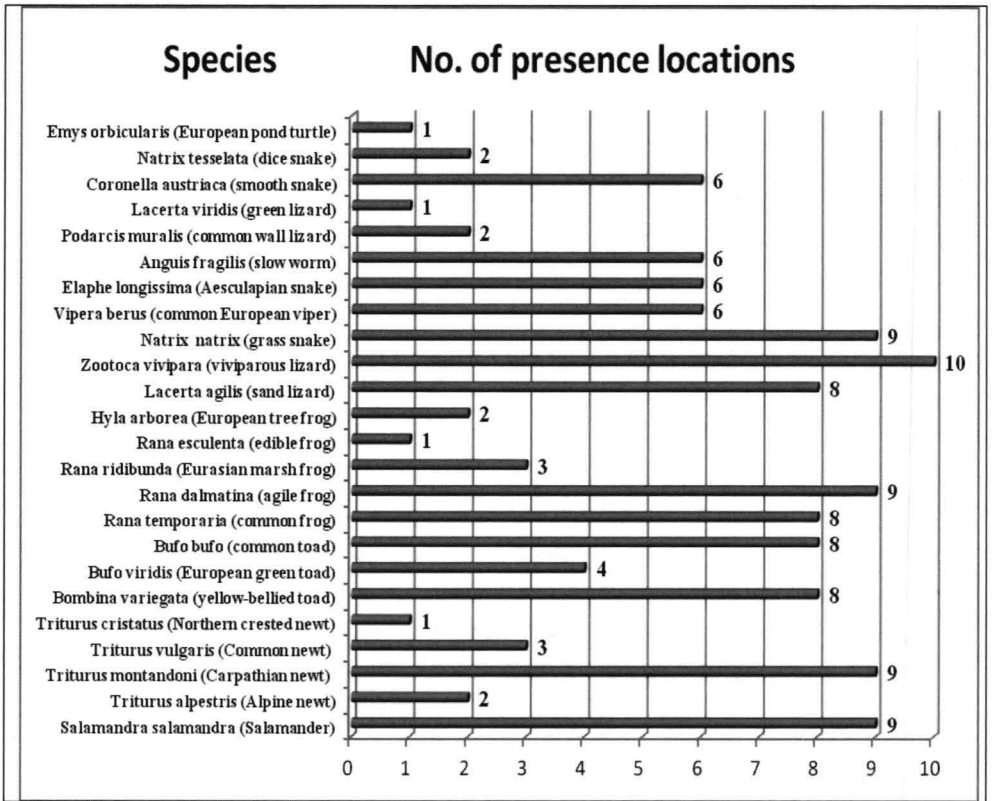

Fig. 4 Distribution of species in investigated habitats in the Rodna Mountains National Park

Some species of amphibians and reptiles are common and can be found in the 10 locations investigated (*Zootoca vivipara*), in 9 locations (*Salamandra salamandra, Triturus montandoni, Rana dalmatina, Natrix natrix*), 8 locations (*Bombina variegata, Bufo bufo, Rana temporaria, Lacerta agilis*). Other are more rare (*Emy orbicularis, Triturus cristatus, Hyla arborea, Lacerta viridis*).

Concerning the legal protection, some species of amphibians and reptiles in the Rodna Mountains National Park have a protected status (Table 3).

https://biblioteca-digitala.ro

Table 3. Legal protected status of herpetofauna from Rodna Mountains National Park

No.	Species	Law 13/1993	Directive 92/43 CEE	Law 462/2001	OUG 57/2007	International status	Romanian status
1	*Salamandra salamandra*	III	-	IV	IVB	LC	VU
2	*Triturus alpestris*	III	-	IV	IVB	LC	VU
3	*Triturus montandoni*	II	II, IV	-	III, IVA	LC	VU
4	*Triturus vulgaris*	III	-	-	IVB	LC	NT
5	*Triturus cristatus*	II	II, IV	III, IV	III, IVA	LC	VU
6	*Bombina variegata*	II	II, IV	III, IV	III, IVA	LC	NT
7	*Bufo viridis*	II	IV	IV	IVA	LC	NT
8	*Bufo bufo*	III	-	III	IVB	LC	NT
9	*Rana temporaria*	III	V	V	IVB, VA	LC	VU
10	*Rana dalmatina*	II	IV	V	IVA	LC	VU
11	*Rana ridibunda*	III	V	V	IVA	LC	NE
12	*Rana esculenta*	III	V	V	IVA	LC	NE
13	*Hyla arborea*	II	IV	III, IV	IVA	LC	VU

https://biblioteca-digitala.ro

No.	Species	Law 13/1993	Directive 92/43 CEE	Law 462/2001	OUG 57/2007	International status	Romanian status
14	*Lacerta agilis*	II	IV	IV	IVA	LC	NE
15	*Zootoca vivipara*	III	-	-	IVA	LC	NE
16	*Natrix natrix*	III	-	-	-	LC	NE
17	*Vipera berus*	III	-	IV	IVB	LC	EN
18	*Elaphe longissima*	II	IV	IV	IVA	LC	VU
19	*Anguis fragilis*	III	-	-	IVB	NE	VU
20	*Podarcis muralis*	II	IV	IV	IVA	LC	VU
21	*Lacerta viridis*	II	IV	IV	IVA	LC	NE
22	*Coronella austriaca*	II	IV	IV	IVA	NE	VU
23	*Natrix tesselata*	II	IV	IV	IVA	LC	NT
24	*Emys orbicularis*	II	II, IV	III, IV	III, IVA	NT	VU

https://biblioteca-digitala.ro

The international IUCN status is as follows: CR - critically endangered, EN - endangered, VU - vulnerable, NR - near threatened, LC - least concern, NE - not evaluated. The status in Romania was assessed according to the Red Book of Vertebrates in Romania (Botnariuc, N., Tatole, V., 2005): CR - critically endangered, EN - endangered, VU - vulnerable, NT - almost threatened, LC - conservation concern, Ne – not assesed.

The legislation envisaged for the evaluation of herpetofauna is presented in the following terms:

- Law 13 of 1993 by which Romania ratifies the Berne Convention (ANNEX 2 - strictly protected species of fauna, ANNEX 3 - protected fauna species);
- European Directive 92/43/EEC (ANNEX II - Species of animals of Community interest the conservation of which requires the designation of special areas of conservation, ANNEX IV - Animal species of Community importance requiring strict protection, ANNEX V - Species of animals of Community interest Community importance for which sampling and exploitation may be subject to management measures);
- Law no. 462/2001 on the regime of natural protected areas, the conservation of natural habitats, wild flora and fauna (ANNEX 3 - Species of animals whose conservation requires the designation of special areas of conservation and special protection areas for avifauna, ANNEX 4 - Species of animals requiring a strict protection, ANNEX 5 - Animal species of Community interest whose sampling and exploitation are subject to management measures);
- Government Emergency Ordinance no. 57/2007 on the regime of natural protected areas, conservation of natural habitats, wild flora and fauna, approved with further modifications and additions (ANNEX 3 - Species of animals whose conservation requires the designation of special areas of conservation, ANNEX 4A - Species of Community interest - Species of animals requiring strict protection ANNEX 4B - Species of national interest - Species of animals requiring strict protection ANNEX 5A - Species of Community interest - Animal species of Community interest).

Thus, of the 24 species listed by amphibians and reptiles, 3 species are of community interest (*Triturus montandoni, Triturus cristatus, Bombina variegata*), 13 species strictly protected (Annex II of the Law 13/1993), 9 vulnerable species in Romania.

https://biblioteca-digitala.ro

Conclusions

Following the herpetological inventory of 2004-1417 in the National Park and the Natura 2000 Rodna Mountains, 24 species were identified in 10 mountain valleys, including 13 species of amphibians and 11 species of reptiles. The herpetological records were applied between 500-2303 m.

Some species are common (*Triturus montandoni, Rana dalmatina, Bombina variegata, Bufo bufo, Zootoca vivipara, Natrix natrix, Lacerta agilis*), and other species have isolated populations in certain habitats of the Rodna Mountains National Park (*Podarcis muralis* on *Corongis* limestone, *Triturus cristatus, Emys orbicularis, Hyla arborea*).

Of the 24 species listed by amphibians and reptiles, 3 species are of community interest (*Triturus montandoni, Triturus cristatus, Bombina variegata*), 13 species strictly protected (Annex II of Law 13/1993), 9 vulnerable species in Romania.

Bibliography

1. Andrei M., 1997: Note on the herpetofauna of the Maramureş (Romania). Trav. Mus. Nat. d'Hist. Nat. Gr. Antipa, 37: 129 - 133.
2. Ardelean G., Bereş, I., 2000: Fauna de Vertebrate a Maramureşului. Editura Dacia, Cluj Napoca. Colecţia Universitaria.
3. Beebee T. J. C., Griffiths, R. A., 2005: The amphibian decline crisis: A watershed for conservation biology? Biological Conservation, 125: 271 - 285..
1. Bereş (I.), 1990: Influenţa zonelor umede în repartiţia şi conservarea vertebratelor din Maramureş. Revista Muzeelor. 5, 65-72.
2. Bereş I., 1996: Observaţii ornitologice şi asupra altor vertebrate din zona Nireş. In: Salvaţi flora, fauna şi tinoavele maramureşene de pe platoul vulcanic Igniş. Societatea Ecologistă Sighetu Marmaţiei: 26 - 27.
3. Bereş I., 1997: Contribuţii la cunoaşterea faunei amfibienilor şi reptilelor din Depresiunea Maramureşului şi protecţia lor. Nymphaea (Oradea) 23-25: 151-154.
4. Borcea M., 1983: Fauna de amfibii şi reptile din Munţii Rodnei, prezentare zoogeografică. În: Rezervaţia Pietrosul Rodnei la 50 ani: Baia Mare, 120 - 127.
5. Berger L., 1966: Biometrical studies on the population of water frog from the environs of Poznan. Ann. Zool. 23, 303-324.
6. Berger L., 1973: Systematics and hybridization in European green frogs of *Rana esculenta*. Complex. J. Herpetol. 7, 1-10.
7. Botnariuc N., Tatole V., 2005: Cartea roşie a vertebratelor din România, Editura Muzeul de Istorie Naturală „*Grigore Antipa*", Bucureşti.
8. Cogălniceanu D., Aioanei F., Bogdan M. 2000: Amfibienii din România, Determinator. Ed. Ars Docendi, Bucureşti, 1-99.
9. Cogălniceanu D., 2002: Amfibienii din România – ghid de teren, www.ecoportal.ro/dan_cogalniceanu/.../Amfibienii_din_Romania_ghid_de_teren.pdf.

https://biblioteca-digitala.ro

10.Cogălniceanu D., Băncilă R., Samoilă C., Hartel T. and Tudor M., 2007: The herpetofauna of the Maramureş Mountains Natural Park. The 1st International Conference Environoment - Natural Sciences - Food Industry in European Context, Baia Mare, România: 300 - 305.
11.Dehelean I., Ardelean, G., 2000: Herpetofauna zonei Firiza (Baia Mare). Satu Mare - Studii şi Comunicări, 1: 155 - 159.
12.Frivaldszky J., 1871: Adatok Máramaros vármegye faunájához. Jelentés az 1871 év julius havában e megyébe tett állattani kirándulásról. Math. És Természettud Közlemények 9: 183 - 233.
13.Fuhn I., 1960: Amphibia. Fauna R. P. R., Bucureşti, 14 (1): 1 - 228.
14.Fuhn I. and Vancea, S., 1961: Reptilia. Fauna R. P. R, Edit. Acad. R. P. R., Bucureşti, 14 (2): 1 - 352.
15.Gent A. H., Spellerberg I. F., 1993: Movement rates of the Smooth Snake *Coronella austriaca* (Colubridae): a radio telemetric study. Herpetological Journal 3: 140 - 146.
16.Ghira I., Mara G., 2000: Using the allelomorphic feature in identifying two species belonging to genus *Bombina* (*Anura, Discoglossidae*) from Transilvania. Studia Univ. Babeş-Bolyai, Cluj-Napoca, XLV, 85-95.
17.Ghira I., Venczel M., Covaciu-Marcov S. D., Mara G., Ghile P., Hartel T., Török Z., Racz T., Farkas Z. and Brad T., 2002: Mapping of Transylvanian herpetofauna. Nymphaea 29: 145 - 201.
18.Goddard, P., 1984: Morphology, growth, food habits and population characteristics of the Smooth Snake *Coronella austriaca* in southern Britain. Journal of Zoology London 204: 241 - 257.
19.Kéry M., 2002: Inferring the absence of a species - a case study of snakes. Journal of Wildlife Management 66: 330 - 338.
20.Lehrer A., Lehrer M., 1990: Cartografierea faunei şi florei României (coordonate arealografice), Ed. Ceres, Bucureşti, pag. 1 - 290.
21.Luiselli L., Capizzi, D., 1997: Influences of area, isolation and habitat features on distribution of snakes in Mediterranean fragmented woodlands. Biodiversity and Conservation 6: 1339 - 1351.
22.Micluţă H., 1969: Contribuţii la cunoaşterea broaştei de mlaştină – *Rana arvalis*. Notă preliminară. Bul. Şiinţ. Inst. Pedag. Baia Mare, ser. B, 1: 107 - 111.
23.Micluţă H., 1970: Note faunistice herpetologice din judeţul Maramureş. Bul. Ştiint. Inst. Pedag. Baia Mare, Ser. B, Baia Mare, 2: 39 - 42.
24.Santos X., Brito J. C., Pleguezuelos J. M. and Llorente G. A., 2007: Comparing Filippi and Luiselli's (2000) method with a cartographic approach to assess the conservation status of secretive species: the case of the Iberian snake-fauna. Amphibia - Reptilia. 28: 17 - 23.
25.Spellerberg J. F. and Phelps, T. E., 1977: Biology, general ecology and behaviour of the snake Coronella austriaca. Biological Journal of the Linnean Society 9: 133 - 164.

https://biblioteca-digitala.ro

26.Strugariu Al., Gherghel I., Volosciuc-Hutuleac M.V., Săhlean T.C., Sas I., Puşcaşu C.M., 2006: Preliminary data concerning the distribution of amphibian fauna in Suceava County (Romania). Analele Univ. din Oradea, Fasc. Biol., 39-47.
27.Stugren B. and Popovici N., 1961: Note faunistice herpetologice din R. P. R. II. Stud. Cerc. Biol., Cluj-Napoca, 12: 229 - 234.
28.Szymura J. M., 1993: Analysis of hybrid zones with *Bombina*. In Hibrid zones and the evolutionary process (ed R. G. Harrison), pp 261-289. Oxford: Oxford University Press.
29.Török Z., 1997: Data on the amphibians and reptiles from the Lăpuş river catchment area (Romania). Trav. Mus. Nat. d'Hist. Nat. Gr. Antipa, 39: 197 - 207.
30.Török Z., 1997: Herpetofauna bazinului Baia Mare. Anal. Univ. Ovidius Constanţa, seria Biologie-Ecologie, 1: 153 - 158.
31.Török Z. 1998: Data on the actual status of the amphibian and reptile populations of the Someş River catchment area (Romania). Studii şi Cercetări, seria Biologie, Universitatea Bacău, 2: 227 - 232.
32.Török Z. 1999: Data on the distribution of amphibians and reptiles in Gutâi and Igniş mountains. Studii şi Cercetări, Seria Biologie, Universitatea Bacău, 4: 113 - 118.
33.Török Z. 2000 – Date privind corologia şi protecţia amfibienilor şi reptilelor din munţii Igniş. Satu Mare - Studii şi Comunicări, vol. 1 - Stiinţele naturii, pag. 160 - 170..
34.Török Z., Bereş, I. 1996: Starea actuală a herpetologiei în judeţul Maramureş. Ocrot. Nat. Med. Înconj., Bucureşti, 40: 99 – 102.
35.Török (Zs.), Ghira (I.(, Sas (I.), Zamfirescu (Şt.), 2013: Ghid sintetic de monitorizare a speciilor comunitare de reptile şi amfibieni din România. Editura Centrul de Informare Tehnologic Delta Dunării, Tulcea, România

Whitfield G. J., Scott D. E., Ryan J. T., Buhlmann A. K., Tuberville D. T., Metts S. B., Greene J. L., Mills T., Leiden Y., Poppy S., Winne, T. C., 2000: Global Decline of reptiles, Déjà Vu Amphibians. BioScience, 50: 653 - 666..

*** IUCN, 2005 – 2001 IUCN Red List Categories and Criteria version 3.1. ttp://www. iucnredlist.org/info/categories_criteria.html. Prepared bythe IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK

https://biblioteca-digitala.ro